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Public Pension Governance and Performance

Lessons for Developing Countries

Olivia Mitchell

Lessons U.S. pension analysts learned.

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This paper — a product of the Finance and Private Sector Development Division, Policy Research Department — is part of a larger effort in the department to investigate the complex issues related to old age security arrangements. The study was funded by the Bank's Research Support Budget under research project "Income Security for Old Age" (RPO 677-45). Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Daniele Evans, room N9-057, extension 37496 (October 1993, 73 pages).

Mitchell examines the relationship between public sector pension plan performance and management practices to improve the design and governance of public pensions in developing countries. Understanding this relationship is important because better yields on public pension plan investments reduce the need for additional taxes to support retirees — and well-funded plans stand a better chance of paying promised benefits.

Her model relates investment returns on public pension assets, as well as plan funding status, to features characterizing the pension systems' governance structure and authority, using a new data set on U.S. state and local public sector plans. Certain findings stand out:

- The higher the fraction of retirees elected to the pension board, the stronger the negative effect on investment return in 1990, and the more variable the returns.

- Systems fared about the same whether they had in-house or external money managers, or independent performance analysis (even if the external managers were drawn from the "top 10"). But public pensions performed better when fund and actuarial computations were done by professional actuarial and investment couselors rather than relying on former or current employees to choose investment strategies.

- Social investment rules hurt public pension yields. Public pension plans which mandated that a certain portion of investments be director to in-state projects generated much lower returns.

The data show that many public pension systems funded their plans satisfactorily but others did not. The results show that:

- Fiscal stress reduced stock funding ratios.

- Stock funding rates were lower, the higher the fraction of elected retirees and elected active workers represented on the pension system board.

- Stock funding ratios were higher when a system had in-house actuaries, when the board authorized benefit levels, and when board members had liability insurance.

- Stock funding rates were unaltered by state statutes guaranteering that benefits be guaranteed by law, or by legally set funding requirements, or by the state's ability to carry budget deficits from one year to the next. Nor did they vary when dedicated or special taxes were earmarked for pension revenue.

Policymakers in developing countries can profit from the mistakes made and lessons learned by U.S. pension analysts. although no single package of pension plan practices can optimize investment performance for all systems across all time periods, care must be taken when designing the regulatory and investment environment in which these plans operate. Developing countries should study the work of the U.S. Government Accounting Standards Board.

Mitchell discusses some of the complex issues that must be confronted when establishing funding norms for defined benefit pension plans in the public sector.

Public Pension Governance and Performance: Lessons for Developing Countries

by

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Public Sector Pension Governance and Performance: Lessons for Developing Countries

Olivia S. Mitchell

The cost of supporting retirees has risen quickly in both developed and developing nations, and promises to become ever greater in decades to come. Policymakers seek to prepare for these costs by designing better functioning pension plan structures. One item on the policy agenda is to improve pension plan investment and funding performance. This paper examines public sector pension plans in the United States, asking why some plans appear to have been well-managed, and what structural design features are associated with good pension management outcomes. A new data set on more than 200 state and local public sector plans in the U.S. indicates that many of these pensions experience decent investment performance, and some are relatively well-funded. Offsetting these successful plans is the experience of other pension systems who report poor investment performance and underfunding difficulties. Our analysis examines the relationship between public sector plan performance and management practices, seeking to draw lessons which might improve the design and governance of public pensions in developing countries.

The two pension plan performance outcome measures of central interest in this paper are the yields on public pension system assets, and the public pension plans' funding status. Investment performance is important since higher yields reduce the need for additional taxes to support current and future retirees. Pension funding is important since better funded plans stand a better chance of having assets on hand to pay promised benefits.

This study relates these two pension plan outcomes to a variety of features characterizing each pension system's governance structure and authority, reporting requirements, and other factors affecting the environment in which the pension funds operate.

Section I of the paper develops a series of hypotheses regarding public pension plans' investment performance, linking pension governance, while Section II examines determinants of funding patterns. Empirical analysis in Section III suggests that investment performance in 1990 was reduced by having a heavy representation of elected retirees serving on the public pension Board, and by mandates that a specified portion of pension assets be earmarked for in-state projects. Systems fared about the same irrespective of whether they had in-house or external money managers, or independent performance analysts. The empirical analysis also shows that fiscal stress was found to systematically and powerfully reduce pension funding, as did having a large representation of elected retirees and active workers on the pension system Board. Pension funding was higher when the system employed in-house actuaries, when the Board was required to authorize benefit levels, and when Board members had liability insurance. Section IV evaluates these results in light of slightly different empirical specifications. Finally, Section V draws lessons from this research for policymakers in developing countries, in the hope that they may benefit from the experience of public pension plans in the United States.

I. The Determinants of Public Pension Investment Performance

Often referred to as "public employee retirement systems" (PERS), retirement systems established for individuals employed by state and local governments

have become large and powerful institutions in the last three decades. Typically these are defined benefit pension plans, which provide workers an annual benefit accrual (usually a function of pay and years of service). This accrual converts into a retirement annuity payment when the employee attains a specified age and service under the plan. Recent surveys (see Table 1) show that there are approximately 2,400 public pension systems in the U.S., covering about 10 million full-time public sector employees and about 3 million pension beneficiaries -- mainly employees of state and local governments, and often teachers and other school employees, police and firefighters, judges, correctional officers, and other public servants.[1] These plans pay relatively generous benefit levels, amounting to some 40% of pre-retirement pay at relatively young retirement ages; usually PERS retirement benefits are at least partially indexed to inflation.

Benefit promises which accrue under PERS plans are liabilities that the sponsor is expected to pay retirees at some future date. Practice varies as to whether public employers back up these promises by making payments to a segregated pension trust fund, which are then invested to generate eventual benefit payments. Many PERS plans have succeeded in amassing substantial funds: in the U.S., public pensions held about $730 billion at the end of the 1980's, accounting for 5% of the country's total financial assets, 13% of all domestic bonds, and almost 8% of all domestic equities (Hoffman and Mondejar 1992).

A major responsibility of those charged with managing public sector pensions is to direct the investment of these assets. Research suggests that PERS funds have been

managed somewhat differently from those in private sector pensions. Thus Table 2 indicates that until 1960, corporate equities constituted only a negligible fraction of state and local plan assets, while government securities and corporate bonds were much more heavily favored than private plans. This pattern of asset holdings was in part motivated by state and local government rules prohibiting pension managers from investing in what were perceived to be "risky" assets including equity, venture capital, and foreign holdings.

Though these strictures have been curtailed over the last decade, yields on public pension fund assets have frequently been low, with public plans earning rates of return substantially below those of other pooled funds, and often below leading market indices.[2] Table 3 demonstrates this for the eighteen year period 1968-86, and the pattern persists in more recent statistics. More recently, state and local pension plans reported annual returns averaging 11.13%, during a time when bonds rose by 15.5% and securities by 13.9% (Table 4).

One explanation for why public plan investment yields are often low is that they are operated according to principles different from those adopted in the private sector. Specifically, many public pensions are managed by staff which must respond to political as well as economic incentives and pressures. A typical public system is governed by a Board of Directors comprised of eight members, on average, with three elected members, three appointed members (often by the Governor), and two serving *ex officio* (e.g. the State Treasurer, the superintendent of schools, etc). Those elected to public pension Boards are frequently active employees, which is quite uncommon in the private sector; in addition, in

many cases retired workers are also included as Board members (Zorn 1991).

Because public pension Boards are managed by political appointees and covered pension members, it is at least plausible that they may select investments different from those chosen by private-sector professionals competing in the capital market. There is little direct evidence on this point in the public sector, but in the private sector, pension participants appear to invest more conservatively than do professional pension managers (EBRI 1993). Hence it is hypothesized that better performance from public pensions could be observed when public systems manage their funds professionally, instead of relying on former or current employees.

Another way that pension governance structures might alter PERS investment yields is due to the fact that Board authority varies a great deal across public pension plans, depending on laws which vary from state to state, and also depending on custom and tradition (Zorn 1991). For example, some PERS Boards have a great deal of responsibility for investment decisions, they control actuarial inflation and interest rate assumptions, and direct the system's reporting practices. In other cases, external professional money managers and actuaries manage investments and reporting, leaving day-to-day benefit payments and record-keeping functions to the Board. The latter tasks are substantial: public sector pension plans reported an average of 42,000 active members per plan and $2.8 billion in assets, with annual administrative costs totalling about 1-4% of assets.[3] Large plans can service many of these needs in-house, employing on the average one staff member per 1,000 plan participants. Smaller plans are more likely to use external actuarial,

legal, and accounting firms, and frequently employ professional money managers and/or investment consultants as well (Zorn 1991).

When private sector pension systems manage their benefits administration and investment in-house, researchers have found substantial evidence of economies of scale in larger plans (Mitchell and Andrews 1981). It is therefore reasonable to expect that larger public pension plans might also experience higher yields, and perhaps less variability in yields, than would smaller plans. It is, of course, possible that small plans could capture most of these scale economies by hiring external professional money managers and consultants. For this reason, it would be important to determine whether investment returns vary with having outside money managers. Furthermore, some private sector money managers are more successful than others, as discussed by Lakonishok et al (1992). Thus investment management firms in the Top 10 performance group tend to do relatively well as investors; as others have pointed out, however, the Top 10 group is costly to employ, and might not produce higher net returns (after subtracting commissions). Hence it may be hypothesized that public plan performance will depend positively on plan size if scale economies prevail (conditional on managing the money in-house), and may be higher if outside managers (especially Top 10 performers) can generate higher net returns conditional on plan size.

Offsetting the hypothesis that external investment advice might result in higher and less variable pension asset yields, is the recent finding that net investment returns are sometimes lower when investment managers are subjected to frequent

performance reviews. This is because of a principal/agent problem: money managers appear to alter their portfolios in ways which systematically make them look better over the short run, but which in the long run prove costly for the fund.[4] Applying the argument to the PERS sector, it might be predicted that systems using external money managers and who employ frequent valuations might experience lower net rates of return than would systems using only in-house managers, particularly if they are evaluated relatively infrequently (*ceteris paribus*). Thus in empirical analysis of pension asset yields it will be important to control not only on who is managing the portfolio, but also on how often they report how they are doing.

Pension plan asset performance clearly depends on other factors in addition to the ones just described, with perhaps the most important one being the fund's portfolio mix. As noted earlier, public plans tend to hold fewer stocks than do private pensions, in part because the federal government requires private pension fiduciaries to invest in a well-diversified portfolio of assets chosen for traditional financial reasons. Furthermore, ERISA regulations governing private plans specifically require pension fiduciaries to behave according to generally accepted financial principles, a philosophy summarized as the "prudent man rule". In the public pension arena, no federal legislation controls PERS investment patterns. As a result, there are no legal constraints on those who wish to deploy public pension assets for nontraditional investment purposes, and several groups have become increasingly vocal.[5] For example, the Governor of New York argues that public pension assets be loaned advantageously to firms "conducting business" within his state.

Other states have asked their pension fund managers to only invest in so-called "socially responsible" companies (defined variously as firms who avoid investments in South Africa, firms which do not pollute, etc). While these unconventional investment practices have their appeal, retirees and active workers have expressed concern that their pension assets may earn low returns, and perhaps be insufficiently diversified (New York State Industrial Cooperation Council 1989 and 1990; New York Retired Public Employees Association 1989; Snell and Wolfe 1990).

These differences in PERS investment practices imply that public pension plan returns may vary because of strictures placed on the plans by the political process, strictures which may not be in evidence in privately-run pension plans. As a result, empirical analysis of PERS performance should take into account whether investors operate under constraints which might include ceilings on the fraction of assets in bonds or stocks, rules requiring fiduciaries to diversify their portfolios in a manner which might be deemed "prudent" by impartial financial experts, and requirements that money must be directed to "socially acceptable" ventures. If these strictures are effective, they may lower returns, and possibly increase risk.

II. The Determinants of Public Sector Pension Funding Practices

U.S. law requires private employers to explicitly recognize their accumulating pension liabilities, and then set aside contributions in an orderly fashion so as to build up assets sufficient to meet benefit promises when workers retire. The rationale for full pension funding in the private sector is that sponsoring companies may go bankrupt, and

unless the pension plan has received assets sufficient to cover benefit promises, retirees could face curtailed or terminated benefit payments.[6]

In the public sector, pension funding practice has been much more variable, both in the U.S. and elsewhere. This is partly because many deem the risk of government bankruptcy to be low, and thus less persuasive as a rationale for prefunding. As a result, partially funded or completely unfunded (pay-as-you-go or PAYGO) plans have been the norm for most O.E.C.D. nations (James 1992). At the state level in the U.S., funding practices also vary: in some cases, state laws do require prefunding for accumulating pension liabilities, but in other cases they do not. (For constitutional reasons, the Federal government has not regulated state-level public pensions).

Despite the PAYGO tradition, there are many arguments favoring substantial pension prefunding in the public sector. Funds invested earn the pension plan investment income, which "can substantially reduce the employer's ultimate payment for such benefits" (Bleakney 1972: 16) -- a particularly important matter in view of the aging of the public sector workforce over the next two decades (Mitchell 1991). Also, underfunded pensions impose an implicit future liability on taxpayers, reducing the ability of states and localities to raise funds in other ways (Epple and Schipper 1981). In addition, public sector retirees' income security can also be reduced by underfunding; indeed some public employees have sought offset the risk of underfunded pension promises by demanding higher pay (Smith 1981; Mitchell and Smith 1992b). Some have also contended that PAYGO systems decrease savings and impose politically unpalatable redistributive burdens across cohorts

(James 1992).

Despite thee arguments favoring prefunding of benefit promises, public sector pension plans have typically accumulated fewer assets relative to benefits, than have their private sector counterparts (Table 5). In the 1980's, many public employers contributed less to their public employees' pension accounts than they were required to according to actuarial computations. This is in part due to shortfalls in tax revenue collected by American states and cities during the last recession, leading some public employers to fall behind on their pension contribution schedules. Many public pensions are therefore underfunded, meaning that plan assets are insufficient to cover benefits promised to retirees. A study of 1989 data showed that state and local employer pension contributions were about 10-15% below target, and the pattern of shortfall was most persistent for systems where unemployment was higher than it had been for some time. This effect persisted even when controlling for habit persistence, holding constant past cumulative funding levels (Mitchell and Smith 1992 a and b). Therefore a full analysis of funding must take into account the possibility that fiscal stress undermines PERS plans' financial stability.

Previous research suggests several reasons that the structure of PERS Boards might have an effect on pension funding. One consideration is that a Board composed of political appointees may feel differently about funding requirements than would a Board heavily weighted with pension-covered elected members. As an example of this, consider the court case recently filed by California state retirees against Governor Pete Wilson. State budget deficits at the end of the 1980s drove the Governor to propose raising the

public pension plan's assumed interest rate from 8.5% to 9.5%, a position opposed by retirees who argued that "...manipulating the rate of return on plan investments, though within legally 'reasonable limits', can substantially reduce employer contributions to the point where a pension plan can be substantially underfunded and put at high risk." (Hemmerick 1991b: 39). When the partly-elected PERS Board refused to implement it, he then moved to dissolve it and construct a Board more conducive to his needs. Hence it is should be determined whether Board composition has a potent effect on pension funding patterns, with the expectation that plan participants, particularly retirees, might be expected to exert a positive influence on funding (other things equal).

Working counter to this hypothesis is the fact that pension funding is an extremely complex and difficult area, which elected workers and retirees may be unable to fully scrutinize. Their lack of adequate technical training is exacerbated by the fact that data are difficult to obtain, and figures depend a great deal on underlying assumptions used to evaluate future benefit obligations as well as assets on hand. While little research in the funding area has been conducted, studies have shown that covered pension participants typically have very poor understanding of their pension plan's rules and features (Mitchell 1988) For this reason, having professional representatives on the PERS Board could improve funding, especially as compared to relatively nontechnical pension participants. Which effect dominates is an empirical matter.

In addition to Board composition, other PERS management practices can also influence funding outcomes directly. Specifically, some systems use in-house staff

actuaries, increasing funding if these staffers are relatively free from political suasion, but decreasing it otherwise. When the PERS Board is required to authorize benefit increases, rather than simply passing on increases negotiated by state and local employees independently, this could translate into higher funding rates -- after all, authorization to provide future benefits would be required from those managing the funding process. It is also worth investigating whether funding is improved when Board members have liability insurance, which if true suggests that the private insurance market may enforce funding stringencies on PERS Boards when political tensions pull in other directions.

Another set of factors influencing funding may be the reporting requirements to which pension managers respond. While public pension accounting practice embraces some common assumptions and standards across states and localities, the remaining differences make it difficult to compare public plan investment performance and funding outcomes in some cases. This problem has been recognized by many pension analysts over the years, and is slowly being remedied by the Governmental Accounting Standards Board which is devising a framework for public pension financial reporting (GASB 1992). The majority of large state and local plans now conform to GASB Statement No. 5 (GASB 1986) which specifies that public pension plans must report assets at market value, and liabilities measured according to a concept known as the Pension Benefit Obligation (PBO).[7] As a result of this increasing standardization, it is now much more likely that stock funding ratios are accurate, by which is meant that pension assets are correctly computed as a fraction of liabilities. This contrasts with practice a decade ago when most

PERS plans reported assets at cost, and used a variety of different methods to compute liability measures (Schmitt et al. 1991). Despite this progress, a cross-plan analysis of funding still requires paying attention to different approaches used in reporting assets and funding.

Along the same lines, it might be expected that more frequent reporting would tend to induce standardization, so that better funding would be expected of a PERS required to report to its sponsoring employer and participating members more often. Audits and actuarial valuations are also carried out at different intervals, and the reporting standards themselves vary. These different reporting methods may simply affect data quality without altering investment and funding performance, but many fear they have more potent effects altering plan outcomes materially. These cross-plan differences should be controlled in empirical analysis, and examined to see if they influence PERS funding outcomes materially.

Other variations in pension reporting are also important, particularly in the case where flow funding measures are considered. For the purpose of this discussion, flow funding is defined as the ratio of annual actual employer contributions, to annual required contributions. Variations in flow funding measures are partly due to laws governing pension funding practices which differ across states. As an example, the fire and police pension plans in Portland, Oregon, obey a law which sets the public employer's annual contribution rates as a fraction of payroll, and this contribution rate is generally met. Consequently the pension financial statement indicates that the employer's actual

contributions are exactly equal to required contributions, resulting in a flow funding rate of 100%. In fact, however, the system has virtually no assets since it is operated on a PAYGO basis.[8] Therefore the flow funding figure reported by this plan does not represent the actuarial figures that the accounting standards profession would prefer under its proposed reporting rules. A related problem arising in the reporting context arises when a system uses the PBO measure to report GASB-sanctioned funding measures, but uses some other actuarial method to compute annual required employer contributions. It is possible that a plan would then appear well funded by the officially recommended PBO measure, but would be less than fully funded by the system's own accounting measure. This has apparently occurred in several instances over the last two years, where employers were able to dramatically cut their contributions after converting to new actuarial methods consistent with the PBO measure.[9]As a consequence, it is important to investigate whether differences in funding patterns are related to different methods of computing liabilities for reporting, versus funding, purposes.

Funding differences may also result from other factors. In computing pension obligations, for instance, actuaries employ a variety of assumptions to compute promised future benefits. Unbiased estimates of the factors of central interest require that these assumptions be controlled in the empirical analysis, by including plan-specific estimates of expected future price and wage increases, assumed discount rates and retirement ages, integration of benefits with Social Security, whether benefit levels were guaranteed by law, and portability of pension accruals. Pension systems also have some

leeway with regard to their past service liability amortization period, which refers to the time period over which unfunded pension promises from the past are covered from current contributions. Since it is possible that poorly funded plans strategically select an amortization period to improve the funding report, this too should be controlled on in a multivariate funding analysis.

To this list of pension funding determinants must be joined several indicators of the regulatory and fiscal environment in which PERS Board members make funding decisions. Most obviously linked the pension funding outcome is the existence of state-level legally mandated funding requirements. One would anticipate that if such law is binding, it would enhance funding in those states. A variant of this point is that states experiencing severe fiscal stress tend to reduce funding, suggesting that this too should be taken into account in multivariate analysis. Based on previous work, we include a variable indicating fiscal stress, which is the deviation of the state's unemployment rate from its long term trend (Mitchell and Smith 1992a). It is anticipated that greater fiscal stress would reduce funding, perhaps offset if contributions are derived from a special or dedicated tax. In addition other "political economy variables" are explored including an indicator of whether a state has a balanced budget requirement, to assess whether pension underfunding serves as a "safety valve" in cases where the balanced budget rule is taken seriously. Finally, there may be differences in plan participants' ability to exact full funding rates, so it is important to control for the presence of unionized employees and teachers.

III. Empirical Analysis of Public Pension Yields and Funding

The data used for empirical analysis are obtained from a cross sectional survey of 201 pension systems conducted in 1991, covering a total of 269 separate retirement plans. The PENDAT file created from this survey was provided by the Government Finance Officers' Association (Zorn 1991). As of this writing, there is no larger, more up-to-date, and more representative survey of state and local pension plans in the country; the federal government collects no centralized information of this type (though many have suggested it should). Respondent systems included in the PENDAT file represented 73% of state and local active pension plan participants, and 71% of state and local plan assets in 1990 (Zorn 1991). These systems represent the vast majority of the PERS-covered population, but are not necessarily representative of all plans since they are among the largest in the nation, and probably better managed and funded than many smaller plans; as a consequence, interpretation of results must bear this caveat in mind. PERS plans responding to the survey accounted for about a tenth of the estimated universe of state and local pension plans nationally.

The PENDAT datafile is quite extensive, including variables reflecting all aspects of the systems' management, investment, and funding practices as well as plan participant and benefit mixes.[10] Two indicators of investment performance are used as dependent variables for the multivariate analysis -- the actual investment yield rates, and the variability of plans' investment yields -- and two measures of pension funding -- stock and flow funding patterns.

Taking the investment outcomes first, three different ways were chosen to

measure public system's asset performance. Virtually all PERS report one datum for 1990 -- that year's total portfolio return (referred to as Y1ROR), and most also reported their annualized average return over the period 1986-1990 (referred to as Y5ROR). Both variables are reported in nominal dollars (the analysis therefore assumes that all plans experienced identical inflation rates). The fact that the investment yield is averaged over the 5-year span makes it impossible to compute traditional measures of pension performance variability over time, so precise estimates of this concept must await development of panel data. An alternative variability measure used here is the root of the squared deviation between Y1ROR and Y5ROR as a fraction of Y5ROR, defined here as RETURNSD.

Two dependent variables were developed for the funding analysis. The concept which best captures a plan's stock funding rate in the PENDAT survey expresses pension plan assets as a fraction of the Pension Benefit Obligation, and for ease of reference this stock funding measure is termed AST_PBO. An alternative measure focuses on the plan's current funding practices, a concept captured here as FLOWFUND, or the ratio of actual to required employer contributions for the year.

Explanatory variables in the analysis are grouped into five main categories: pension Board composition, Board management practices, investment practices, reporting requirements and assumptions, and other factors which reflect regulations at the state level governing budget and funding practices. Controls are also included for plan size, type of plan and covered employees, and in some cases portfolio composition is incorporated on the grounds that plans with less risky holdings will have lower returns.

Most of these variables were directly derived from the PENDAT file, but outside sources were used in a few instances. The variable called TOP10MG indicates whether the pension system used a money manager in the Top 10 performance group as identified by Lakonishok et al (1992). The term UNEMPD represents the degree of fiscal stress experienced by the state proxied by the deviation of the unemployment rate in 1990 from the mean of the previous nine years; previous analysts suggest that this type of fiscal stress reduces funding possibilities (Mitchell and Smith 1992b). The variable DEFPOS is also derived from outside sources, and indicates whether a state is permitted to carry over a budget deficit from one year to the next. Public pension funding may be seen as an off-budget safety-valve, relieving the pressure of having to meet state balanced budget requirements. Hence pensions may be better funded when state budget deficits can be carried through time, while underfunding may prevail more often when state budgets must be balanced, by law, at year's end.[11]

Summarizing this discussion in a multivariate framework, the following model is postulated:

$$(1) Y_1 = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + a_5 Z + e_1$$

$$(2)\ Y_2 = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 Z + e_2$$

where Y_1 represents a vector of variables reflecting public pension investment performance; Y_2 represents a vector of funding variables; X_1 - X_4 represent vectors of variables reflecting pension Board composition, Board management practices, investment practices, reporting requirements and assumptions; and Z represents a vector of other

factors including state regulations governing budget and funding practices, controls for plan size, type and in some cases portfolio composition. In this section the disturbance terms are assumed to be distributed normally with zero mean; in Section IV this assumption and others, are discussed in more detail.

Evidence on the Investment Performance of State and Local Pension Systems

In 1990, the annual investment yield reported by the 168 PERS systems was 7.74% (Table 6). This compares favorably with market data showing a +6.8% return for securities that year, and with the 1990 inflation rate of 6.1%. However, not all plans performed this well -- one plan reported a -5.5% return that year, while at the other extreme a plan reported a yield of +24.5%.[12]

This range (see Figure 1) is almost certainly due to different portfolio composition patterns across the plans; in the market as a whole, the +6.8% return for securities that year was offset by an average -3.2% yield on bonds, which suggests the importance of holding constant the portfolio composition of pension plans when comparing their investment yields. A narrower frequency distribution of pension yields characterizes YR5ROR, returns averaged over the period 1986-1990 (see Figure 2). Across the 128 plans reporting the figure averaged 11.58%, with the lowest return reported of -2.54% and the highest being 31%.[13] The overall mean was lower than the annualized return on bonds for the same period of 13.5%, but exceeded the average stock return of 10.1% as well as the annualized inflation rate of 3.3%. The pattern of RETURNSD is sketched in Figure 3: this variable increases when there was a larger gap between the 1990 one-year return and

the average return over the 5-year period. Put differently, since most investment yields were low in 1990 as compared to previous years, the plans with a higher value of RETURNSD were those whose 1990 return fell most quickly, relatively speaking.

Table 7 provides multivariate linear regression estimates of equation (1) above, indicating the determinants of pension plan investment yields. The findings show that the composition of the public pension Board appears to matter: specifically, lower yields in 1990 were tied to greater retiree representation on the public pension Boards. This is probably not due to more conservative investment choices made by retirees, since the model controls for the portion of the portfolio held in stocks and bonds. It may be the result of inexpert retiree Board members becoming increasingly activist of late, an explanation buttressed by the fact that the retiree effect was negative but not statistically significant in the five-year yield equation. Another troubling finding is that pension systems with more retirees on the Boards also experienced larger return variability between 1986 and 1990, suggesting that the lower yields in retiree-managed plans were apparently not offset by less risky assets. Before concluding that state governments should move to prohibit retiree participation on pension Boards, it should be noted that appointed members might also reduce asset yields (if improperly selected). Future surveys should focus attention on the new 1990's-brand of pension Board activism and its negative effect on pension plan yields.

Of the several pension management practice variables used in the investment performance equations, few had a powerful effect on pension yields or variability. One

influential practice which did make a difference was a system's practice of permitting administrative costs to be charged to investment income (ADINVST), rather than being covered from state or local budgets directly. This reduced the 5-year average return figure at statistically significant levels, though neither the 1990 return nor the variability measure were powerfully affected. The PENDAT survey does not indicate whether the systems reported net or gross investment returns, but the negative significant effect of ADINVST suggests that the figures given were net of expenses.

This surmise is strengthened by the results of the next three management practice variables reported in Table 7. Many pension systems managed at least some of their pension investments in-house, but this practice apparently had no substantive effect on any of the investment yield outcomes. Some state and local systems used outside money managers and financial counsellors, either in concert with internal management, or exclusively. In all cases, the results indicated that plans investing in-house, or using external money managers fared about the same, even if the external managers were drawn from the "Top 10" group identified by Lakonishok et al. (1992). This is not surprising if the investment yield figures supplied in the PENDAT survey were net returns, since higher gross yields produced by active money managers tend to be equalized after commissions (Ippolito 1989).

Only a few of the rules regarding investment practices proved statistically significant in Table 7. In no case was the prudent man requirement statistically linked to returns or investment variability, though it may be that all pension Boards follow some

variant of this policy (which would explain why no significant effect was discerned). The data also showed no significant effect of state-mandated limits on stockholdings on any of the three investment performance variables. More serious is the powerful negative return observed in pension systems which were required to direct a fraction of their investments in-state. This policy has grown increasingly popular in the last few years among those who propose to use pension funds to build a stronger job and tax base.[14] Unfortunately, there is emerging evidence that such a policy was associated with lower investment returns in 1990 -- by 7 to 8 percentage points. This effect was not detected using the 1985-90 average return, but since it reflects recent trends which may not have been in effect in earlier years, the effect is large enough that it should not be ignored.

Two factors were used to quantify state and local pension system reporting practices in the analysis presented in Table 7; numerous other variables were examined but none proved especially significant. It will be recalled that having independent investment performance analysts and more frequent performance valuations could be predicted to either improve or depress investment yields, depending on whether more reporting is seen as beneficial, or harmful (Lakonishok et al 1992; Benartzi and Thaler 1992). The data do not support either position, however, since neither variable was strongly statistically significant.

Summarizing the findings, the empirical models examined indicate that some pension governance and management factors systematically affected yields and variability, at least for the sample of plans considered here. Three findings stand out:

(1) The fraction of retirees elected to the pension Board had a strong negative effect

on investment return in 1990, and increased return variability.
(2) Systems fared about the same irrespective of whether they had in-house, or external money managers, or independent performance analysis (even if the external managers were drawn from the "Top 10" group).
(3) Social investment rules hurt public pension yields; specifically, public pension plans which mandated that a certain portion of investments be directed to in-state projects generated much lower returns.

Funding Patterns Among State and Local Pension Plans:

As noted earlier, many state and local pension plans follow GASB advisory rules when reporting their pension assets and liabilities. This makes it possible to place some credence in funding figures, particularly with regard to the ratio of the pension plan's assets to its promised benefit liabilities (AST_PBO). As indicated in Figure 4, the stock funding ratio averaged 91% in 1990 (for the 220 plans reporting). There is ample evidence of wide dispersion in funding practice: the minimum stock funding ratio was approximately 0 (for PAYGO plans), and 18 plans were seriously underfunded, having less than half the assets needed to meet pension obligations.[15] On the other hand, the maximum funding ratio was 3.2, and one-third of the plans had sufficient assets to meet projected benefits. For this reason the average stock funding rates of more than 90% should not be taken as evidence that public plans were uniformly well-funded on an accumulated basis.

Annual funding measures capture whether the employer is contributing enough each year enough to cover new benefit accruals and amortization needs from past unfunded obligations. As mentioned earlier, however, there are serious reasons to believe the FLOWFUND figures are biased upward; an employer reporting full compliance with

required contribution levels may sometimes receive monies inadequate to meet eventual benefit promises. This probably explains why the average FLOWFUND ratio in 1990 was 93% (across 187 plans; see Figure 5). The range about the mean is large: at one extreme a plan reported receiving 3.4 times the amount required, while at the other extreme a plan indicated receiving -4.3 times what was required.[16] On the whole, the vast majority (137 of 187) reported receiving contributions less than 100% of required, suggesting that most public sector employers' contributions do not meet required levels. This is troubling, particularly because of the concern that the FLOWFUND variable is biased upward.

Multivariate evidence linking public pension governance and funding patterns according to equation (2) is summarized in Table 8, where both stock and funding patterns are examined. A first hypothesis was that public pension Board composition variables are related to stock funding ratios, and there is support for this position. Specifically, the results show that having more elected members on the Board lowered pension funding rates, with elected retirees having a particularly depressing effect.[17] No composition effect was found in the flow funding equation, however.

Pension management practice also proved informative in explaining funding patterns: three of the four variables used were positively related to stock funding patterns. For instance, the plans appeared better funded when a PERS had in-house actuaries, and the effect was statistically significant. Likewise, if the Board was required to authorize benefit levels, stock and flow funding were higher. There was a positive significant relationship between funding levels and Board members having liability insurance: perhaps this is due

to the increased oversight imposed by private insurers. (On the other hand, flow funding was negatively related to liability coverage -- which may indicate reverse causality, if plans which underfunded on a flow basis were required to purchase insurance in order to induce Board members to serve.)

Pension reporting and assumptions also affected funding outcomes as expected. Pension systems differed according to the frequency and format of funding reports, and stock funding ratios were lower where longer amortization periods were selected -- indeed, it is possible that amortization periods were strategically chosen to improve the funding report. Supporting this view is the finding that plans which did not report their amortization period were even more seriously underfunded than average. Clearly it is necessary to standardize on reporting in order to obtain a clear picture of stock funding practices. Assumptions to compute promised future benefits also played a role in the empirical analysis: the model included variables indicating expected future price and wage increases, assumed discount rates and retirement ages, integration of benefits with Social Security, and portability of pension accruals. Of this set, only the portability factor proved statistically significant at conventional levels, and was negative. This is probably due to the fact that asset accruals did not always follow employees who were permitted to take benefit accruals with them when they changed jobs (usually this is limited to in-state moves). As such, it would be incorrect to conclude that labor mobility *per se* reduces stock funding ratios; rather, funding was low when systems permitted mobile workers to claim benefits with no concomitant asset accumulation backing up the promise.

Of the other factors controlled in the empirical funding analysis, very few had potent effects. Somewhat surprising was the null effect of state requirements that pension plans had to be funded, requirements that benefit levels had to be guaranteed by law, and requirements that states must balance their budgets from one year to the next. Nor were funding levels different when dedicated or special taxes were earmarked for pension revenue.[18] Employee type (i.e. teachers) and unionization status also had no effect. In fact, only one other variable was found to systematically and powerfully reduce stock funding: namely, fiscal stress, measured here by the deviation of recent unemployment from the levels experienced over the last decade. The effect was substantial, suggesting that a 1 percentage point increase in a state's unemployment rate over the long run average would cut stock funding by 6 percentage points. It appears that economic recessions have long as well as short term effects on public budgets through pension plan funding. This effect is consistent with previous studies on public plans (Mitchell and Smith 1992a).

In summary, there is reason to believe that the stock funding figures are of superior quality than the flow funding data, so it is appropriate to emphasize those models and findings. In this dataset, pension underfunding patterns are explained by several factors pertinent to the environment in which the pension Board operated. The most important findings were:

(1) Fiscal stress reduced stock funding ratios.
(2) Stock funding rates were lower, the higher the fraction of elected retirees and elected active workers represented on the pension system Board.
(3) Stock funding ratios were higher when the system had in-house actuaries, when the Board was required to authorize benefit levels, and when Board members had

liability insurance.

(4) Stock funding rates were unaltered by state statutes guaranteeing that benefits were guaranteed by law, or by legally set funding requirements, or by the ability of states to carry budget deficits from one year to the next. They also did not vary when dedicated or special taxes were earmarked for pension revenue.

IV. Sensitivity of Results

Several sensitivity tests were conducted to judge the robustness of the results. One concern has to do with potential endogeneity of particular variables in the Z vector. For example, both the yield and variability equations included in the Z vector the PERS portfolio mix, because the plan's stock and bond holdings were expected to have affected the plan's investment performance. On the other hand, the system's 1990 return and 1990 portfolio mix were probably simultaneously determined in a complex structural system involving expectations over variables not available in the data set. As a test of the model, the potentially endogenous portfolio composition variables were purged and the model reestimated, which produced estimates virtually identical to those reported in Table 7 (results available on request). In a similar vein, it might be asserted that the pension assumptions in equation (2) were endogenously determined by politicians setting funding targets. Hence a reduced-form equation was estimated which excluded pension assumptions from the model. Here too, coefficient estimates for the remaining variables were virtually identical to those reported here (results available on request). Hence it appears that this form of simultaneity does not exert a potent effect on the outcomes of most interest here, namely the pension governance and authority terms.

An additional question examined in some detail, but summarized here for the sake of

brevity, pertained to the issue of biased reporting due to selective missing data. This was handled in two ways. First, if a pension plan had valid data on all but one (or a few) right hand side variables, the missing datum was assigned a value of 0 and a missing-value indicator was given a value of 1. This permitted maintenance of sample size due to incomplete reporting for pension assumptions, in particular. A second approach was taken if the plan lacked a report for a dependent variable, since this raised a question about whether the data were missing randomly. Specifically, it might be that that those plans who were performing less well than the market, or those who were more poorly funded than average, might not be reporting. For this reason, several models were also estimated accounting for the probability of some plans not reporting investment yields and funding ratios. In each case, a sample selection term derived from a Probit nonreport equation (inverse Mills ratio) was incorporated in the regression equations (1 and 2). The selection controls proved to be not statistically significant in general, and other coefficient estimates were quite similar to those reported here (results available on request).

The conclusion from the sensitivity analysis is that the results appearing in Tables 7 and 8 are quite robust to a reasonable range of alternative formulations. They also confirm the important role of several pension governance features in public pension plan outcomes.[19] It must be emphasized that these behavioral patterns are derived from the data at hand, however, and are not necessarily representative of those plans excluded from the PENDAT sample. Specifically, the findings are most applicable to relatively large state-run plans, rather than the smaller local and municipal public plans covering a few officers or other

uniformed public sector workers. As a result, the data are not yet good enough to know whether these smaller plans have the same problems, and same strengths, as their larger counterparts.

V. Conclusions and Discussion

After a decade of strong growth, public pension plans in the United States are at a crossroads. A few state and local retirement systems are in serious straights, having earned large negative rates of return on assets, or in some cases having virtually no assets by 1990. Already some retirees have confront cuts in benefits: in 1991, for example, the California state legislature disallowed two cost-of-living clauses in its public pension plan, earmarking the funds thus generated to "reduce employer contributions in fiscal year 1992-93 and subsequent fiscal years until those amounts are depleted" (court documents cited by Melbinger 1992: 23). In the future, retirees may face more serious cuts, if fund assets prove too meagre to meet benefit promises.

In contrast to these problems experienced in pension plans where employers were subject to most fiscal distress, many public plans have done quite well. The strong capital markets of the 1980's boosted many pension systems' investment portfolios substantially. Increased assets combined with careful money management and adequate employer contributions covered all or most of the benefits promised to current and future retirees. This research shows that better performance from public pensions was attained when plans managed their funds and actuarial computations professionally, instead of relying on former or current employees, and by eschewing investment rules directing funds

to in-state projects.

These conclusions may not be popular with policymakers confronting budgets in distress. Indeed a great deal of effort has recently been directed to developing new ways of *reducing* public pension contributions, and where possible, directing pension assets so as to generate local jobs and investment. A critically important question which is only beginning to be asked is whether the social costs of underfunding and below-market return investments are sufficient to offset their social benefits. In other words from a public finance viewpoint, "socially targeted" infrastructure investments could be justified when the social gains to such investment outweigh the social costs, taking care to note that the costs include potential retiree insecurity when public pension underfunding leads to pension and other benefit cuts. It would be useful to design and implement such a cost/benefit framework when evaluating public pension asset allocation and performance practices. In order to do this, more timely data must be collected which can be examined using a common reporting and accounting framework. Policymakers and researchers in the United States have begun to recognize this need, and have recommended standardization of pension data gathering, probably under the aegis of a federal agency (Melbinger 1992; Mitchell 1991; Munnell 1983).

Fiscal analysts in developing countries may profit from the mistakes and the lessons gleaned from public pensions in the United States. This paper shows that pension systems are extremely complex institutions, so that care must be taken when designing the regulatory and investment environment in which such plans operate. This study did not

seek to identify an optimal package of pension plan practices for all systems across all time periods. However, it did indicate that professional actuarial and investment counsellors must be sought, rather than relying on employees to chose investment strategies which will guarantee eventual benefit payments. (There was no persuasive evidence that hiring a money manager from the most active segment of the market would generate much better portfolio performance). The research also suggested some of the enormously complicated issues that must be confronted when seeking to establish funding norms for defined benefit pension plans in the public sector. The Government Accounting Standards Board in the U.S. has devoted several years to the development of a standardized framework to be used for reporting public pension plan liabilities and assets; their work would be beneficially reviewed by those designing public pensions in developing countries.[20]

In general, if full, or near full, funding of public pension plans is contemplated, it would appear useful to require standardization of pension reporting practices. This is particularly true regarding the myriad assumptions needed to cost out a defined benefit plan's promised obligations, including the amortization period over which past liabilities must be met. This is often a difficult task, inasmuch as defined benefit pension rules determining benefit eligibility and amounts frequently differ from one group of employees to another, as well as across cohorts. Sometimes benefit and contribution regulations have internally inconsistent objectives. Frequently in a developing country there may be insufficient actuarial data to derive assumptions needed for projecting expected labor force patterns, and forecasts of economic trends are also inherently uncertain. For all

these reasons, it is a fairly laborious task to improve reporting and disclosure patterns for public plans. In many cases pension systems are not computerized, making it even more difficult to track investments and participant data. In other cases, there may be substantial evasion of public pension payroll taxes, which can make projections of contribution flows politically disputatious.[21]

This raises a more general concern: how should public pension policies in developing countries be evaluated? For example, mandatory retirement savings programs in most are generally subject to numerous government restrictions -- about where the funds can be be invested domestically and whether any can be invested abroad, about the fund's exposure to inflation and financial market risk, and related questions. Those contemplating mandating retirement savings programs must recognize that these restrictions are a means of reallocating the risks of retirement income security between the public and private sectors, which should be explicitly acknowledged in designing pension funding and investment policy. Whether the social costs of such programs offset their social benefits should be a question explicitly asked, and at least partly answered.

A way to reframe this question is to ask why state and local public pensions tend to be relatively fully funded, at least as compared to most OECD nations which have employed PAYGO financing for some time. One explanation may be that states and localities are prevented from total underfunding because of their relatively mobile populations, who recognize that underfunded plans will impose eventual tax burdens on them. While this is an attractive theory, there is little empirical support showing that

underfunded pension promises are capitalized precisely in property values (Epple and Shipper 1981). There is, however, some suggestion that public sector workers demand a wage premium to compensate them for their underfunded pension promises (Smith 1981; Mitchell and Smith 1992), and other constraints resulting from underfunded pensions might be low bond ratings, for example. These constraints will probably become increasingly binding at the national level, with more flexible international labor and capital mobility, and may begin to restrict national governments' ability to underfund public pension plans as well.

Some analysts suggest that the myriad reporting and funding issues surrounding publicly managed pension plans can be dispensed with, if a defined contribution plan is established, rather than a defined benefit plan. In this latter case, the employer promises only to deposit some contribution rate into an investment account, which then is invested, usually with the proviso that funds cannot be withdrawn until retirement. In the United States, deferred compensation plans of this sort have become increasingly popular since enabling tax law regarding these plans was clarified during the 1980's. All states currently offer such plans to their public sector employees, generally in the form of voluntary supplemental tax-deferred savings plans offered in addition to the conventional defined benefit pension plan. A recent study indicated participation rates of about 24% of eligible workers in the public sector. These plans are even more popular among private employees, where 57% of eligible employees participate in 401(k) defined contribution offerings. The difference in participation rates between public and private

sectors is attributed to the fact that public employees must make the entire contribution themselves and the limit is currently $7,500 per year, (or one-third of compensation) while in the private sector, the contribution limit is higher and companies generally offer workers matching funds (EBRI 1993).

One appeal of these savings plans is that they are self-directed, which means participants can often tailor their own investment portfolios to their individual preferences. In recent years, however, analysts have become concerned that employees participating in deferred pay plans tend to overconcentrate their investment portfolios in low-risk, low-return assets. As a consequence of their conservative stance, future retirees may find that their retirement income is inadequate to meet needs (EBRI 1993). This objection is linked to a broader criticism of these plans, which is that they do not necessarily generate subsistence income for retirees, inasmuch as eventual benefit amounts are linked to contributions, not need (James 1992).

The appeal of mandatory defined contribution plans has been spurred by the recent experiences of Chile's new retirement system. A decade ago, several private investment houses were awarded the management rights over workers' pension plans created as a replacement for the country's foundering PAYGO social security system. The Chilean system's popularity is in part due to the finding that the investment returns under this plan exceeded those of other public retirement systems in Latin America (Mesa Lago 1989 and 1991). While this is laudatory, little is yet known about how well the plans performed relative to an internationally diversified portfolio, which is in principle the

standard which employees and retirees might wish to use. During the first several years of the Chilean pension plan's operation, for instance, the pension system's investment portfolio was limited almost exclusively to government bonds, and only gradually has private domestic equity been permitted. Even more recently, the Chilean defined contribution system has begun to introduce international asset holdings, though are still limited to a fraction of the pension portfolio.[22]

In conclusion, policymakers all over the world confront an aging population. Better functioning pension plan structures must be devised to meet the retirement needs of older persons in both developed and developing countries. A key element in meeting these needs will be the improvement of pension plan investment and funding performance. The U.S. experience cannot be generalized to other countries in every instance, but it does demonstrate that public pension performance is responsive to the financial and administrative environment in which these plans operate. Retirement income security of tomorrow requires designing better pension systems today.

Table 1.

State and Local Pension Plan Characteristics

I. Public Pension Plan Characteristics Through Time

	Year		
	1980	**1985**	**1989**
Total Participants (000)	NA	15,234	16,684
Active Participants (000)	NA	10,364	11,357
Total Assets ($B current)	$162	374	629
Total Contributions ($B current)	$21	37	44
Total Benefits ($B current)	$11	22	33
Number of Plans	NA	2,589	2,387

Source: Piascentini and Foley (1992).

II. Survey of Public Pension Plan Participants in 1989

Pension Feature	
Mean Retirement Benefit[1]	$9,318
Median Retirement Benefit[1]	$7,200
Median Public Pension as % of Pre-retirement Earnings (total)[2]	42%
Median Public Pension as % of Pre-retirement Earnings for those not receiving Social Security[3]	50%
Fraction Receiving Any Post Retirement Benefit Increases[4]	34%
Fraction of Participants Covered by Defined Benefit Plan[5]	70%

Sources:

[1]Phillips (1992), Table 14.9, p. 367.

[2]Phillips (1992), Table 14.13, p. 371.

[3]Phillips (1992), Table 14.7, p. 375.

[4]Phillips (1992), Table 14.20, p. 379.

[5]Phillips (1992), Table 14.25, p. 384. Fraction excludes more than 10% of respondents unable to identify their plan type.

Table 2.

Size and Allocation of Pension Plan Portfolios:

1950-1989

		Fraction of Assets in:			
	Total Assets	**Corporate**	**Corporate**	**US Govt**	
	($B Current)	**Equities**	**Bonds**	**Securities**	
Other					
I. State and local government plans					
1950	$4.9	0.0%	12.2%	51.0%	
36.7%					
1955	10.8	1.9	25.0	43.5	29.6
1960	19.7	3.0	36.0	29.9	31.0
1965	34.1	7.3	50.4	22.3	19.9
1970	60.3	16.7	58.2	10.9	14.1
1975	104.8	23.2	59.0	7.4	10.4

1980	198.1	22.4	47.7	20.2	9.7
1985	404.7	29.7	31.9	30.5	7.9
1989	727.4	39.9	27.3	27.2	5.5

II. Private plans

Noninsured:

1950	$7.1	15.5%	39.4%	32.4%	
12.7%					
1955	18.3	33.3	43.2	16.4	7.1
1960	38.1	43.3	41.2	7.1	8.4
1965	74.4	54.8	30.5	4.0	10.6
1970	112.0	59.9	26.2	2.7	11.2
1975	225.0	48.0	18.6	8.0	25.4
1980	469.6	47.6	16.5	10.8	25.1
1985	848.4	46.4	14.3	12.3	27.0
1989	1,163.5	57.3	12.4	12.3	18.0

Insured:

1950	4.8	4.2	41.7	22.9	31.2
1955	10.1	4.0	43.6	9.9	42.6
1960	16.8	4.8	43.5	6.0	45.8

1965	25.5	6.3	41.6	3.5	48.6
1970	37.5	13.6	37.6	2.4	46.4
1975	64.6	18.6	37.5	2.2	41.8
1980	152.2	16.0	39.9	3.7	40.3
1985	337.9	13.0	35.7	12.9	38.4
1989	525.8	12.3	39.8	11.6	36.3

Note: Insured plans are pension plans whose assets are held by insurance companies.

Source: Hoffman and Mondejar (1992), T. 16.9 and 10, pp. 438-441.

Table 3.

Historic Pension Plan Investment Yields

(1968-1986)

	US State & Local Pension Plan Investment Return[1]	US Large Private Pension Plan Investment Return SEI data[2]	US Large Private Pension Plan Investment Return 5500 data[3]	Canadian Large Private Pension Plan Investment Return[4]	Market Indeces Stocks[5]	Market Indeces Bonds[5]	US Inflation Rate[5]
1968	7.75&	8.4%	--	9.4%	11.1%	2.6%	4.7%
1969	-7.94	-5.2	--	-3.2	-8.5	-8.1	6.1
1970	5.63	1.3	--	1.3	4.0	18.4	5.5
1971	14.76	17.5	--	12.5	14.3	11.0	3.4
1972	12.58	15.3	--	18.4	19.0	7.3	3.4
1973	-9.32	-15.1	--	-2.1	-14.7	1.1	8.8
1974	-13.03	-20.3	--	-12.7	-26.5	-3.1	12.2
1975	19.14	23.1	--	13.2	37.2	14.6	7.0
1976	18.03	17.2	--	12.4	23.8	18.6	4.8
1977	0.31	-2.2	1.6	8.7	-7.2	1.7	6.8
1978	3.16	5.8	6.0	13.5	6.6	-0.1	9.0
1979	6.36	13.7	10.1	15.0	18.4	-4.2	13.3

1980	11.58	20.2	21.9	18.3	32.4	-2.6	12.4
1981	3.00	2.7	5.4	1.5	-4.9	-1.0	8.9
1982	27.22	23.0	18.2	21.1	21.4	43.8	3.9
1983	12.89	15.9	9.4	20.0	22.5	4.7	3.8
1984	--	--	9.9	8.8	6.3	16.4	4.0
1985	--	--	20.0	23.5	32.2	30.9	3.8
1986	--	--	14.1	12.8	18.5	19.8	1.1

Notes:

[1] Public pension plan data from SEI Financial Services reported by Berkowitz & Logue (1986), T. AIII-3.

[2] Large U.S. private plan data from SEI Financial Services reported by McCarthy & Turner (1992) T. 12.1, p. 253.

[3] Large U.S. private plan data from 5500 Reports reported by McCarthy and Turner (1992) T. 12.1, p. 253.

[4] Large Canadian private pension plan data from SEI Financial Services reported by Pesando and Hyatt (1992) T. 1, p. 21.

[5] McCarthy and Turner (1992), Table 12.1, p. 253.

Table 4.

Recent Public Sector Pension Plan Yields:

Annual Averages, 1984-1990

	State & Local Pension Plan Investment Return	Market Indeces		Inflation Rate[7]
		Bonds[7]	Securities[7]	
Average 1984-1990: 4.11%	**11.13%**	**15.51%**	**13.91%**	
1990	6.85[1]	-3.17	6.78	6.11
1988	3.95[2]	16.81	10.70	4.42
Average 1988-90	9.55[3]	15.04	11.24	5.06
Average 1986-90	11.98[4]	13.77	10.66	4.14
Average 1986-88	13.88[5]	13.50	10.09	3.32

Average 1984-88	12.07[6]	15.79	15.51	3.54

Notes:

[1]Zorn (1991), T. VII-7, p. 34; 129 plans.

[2]Zorn (1990), T. 34, p. B34; 108 plans.

[3]Zorn (1991), T. VII-8, p. 35; 85 plans.

[4]Zorn (1991), T. VII-9, p. 36; 85 plans.

[5]Zorn (1990), T. 35, p. B35; 113 plans.

[6]Zorn (1990), T. 36, p. B36; 85 plans.

[7]Ibbotson Associates (1992), T. 13, p. 34.

Table 5.

Pension Plan Stock Funding Ratios in 1991

Ratio of Pension Plan Assets to Pension Plan Liabilities	Fraction of Plans
I. State and Local Plans[1]	
< 50%	8%
50-74	21
75-99	39
≥ 100%	33
II. Private Sector Plans[2]	
< 50%	1%
50-74	4
75-99	10
100-124	25
125-149	22

≥ 150%	38

Sources:

[1]Author's adaptation of unpublished data from GAO.

[2]EBRI (1992), Table 4.20, p. 153.

Table 6.

Descriptive Statistics and Variable Definitions

I. Dependent Variables	Mean	St. Dev.
YR1ROR	7.74	4.9
YR2ROR	11.58	2.9
RETURNSD	0.44	0.3
AST_PBO	0.91	0.3
FLOWFUND	0.93	0.5
II. Explanatory Variables		
BDELAC	0.31	0.3
BDELRT	0.03	0.1
LIABINS	0.42	0.5
BDACTOK	0.83	0.4
BDBENOK	0.72	0.5
ADINVST	0.51	0.5
INVINHS	0.42	0.5
ACCINHS	0.61	0.5
TOPIOMG	0.41	0.5
TOPIO*EXT	0.18	0.4
PRUDMAN	0.85	0.4
INSTATE	0.01	0.1
STKMAX	0.83	0.4
INDINVPF	0.75	0.4
FREQVAL	1.23	0.8
REPSOLO	0.59	0.5
GIVERPT	0.90	0.3
AMORTPER	22.29	13.8
AMORTMS	0.10	0.3
ACTUARUC	0.10	0.3
COLA	0.77	0.4
WDOT	4.81	2.5
WDOTMS	0.19	0.4
PORTABLE	0.35	0.5
EXPROR	7.68	1.2
EXPRORMS	0.01	0.1
INFL	3.53	2.5
INFLMISS	0.32	0.5
AVRETAGE	46.80	24.4
AVRETAGEMS	0.21	0.4
SSINT	0.12	0.3
FUNDLAW	0.58	0.5

DEFPOS	0.40	0.5
TCHRPLAN	0.12	0.3
ASSETS (*10-3)	496.44	7.0
ASSETSSQ (*10-9)	0.05	0.2
BOND	33.16	28.1
STOCK	36.09	17.3
BENNOCUT	0.52	0.5
BENTIERS	0.28	0.5
ISUNION	0.67	0.5
SPECTAX	0.15	0.4
UNEMPD90	-1.73	1.2

(continued)

Table 6 (continued)

Variable Definitions
Note: All variables are derived from the PENDAT file described in Zorn (1991) unless otherwise indicated. All variables are qualitative (0,1) unless specified.

Dependent Variables

YR1ROR	Annual rate of return reported in 1991 survey (%).
YR5ROR:	Average annualized rate of return 1986-90 reported in 1991 survey (%).
RETURNSD:	Return Variability (%) = {([1990 Return - (1986-90 Average Return)]**2)**1/2} / (1986-90 Average Return)
AST_PBO:	Ratio of reported pension system assets to PBO measure of cumulative plan liabilities (%).
FLOWFUND:	Ratio of annual actual to required employer plan contributions (%).

Independent Variables

A. Pension Board Composition

BDELAC:	Fraction of pension Board elected by active employees (%).
BDELRT:	Fraction of pension Board elected by retired employees (%).
BDBENOK:	Board is required to authorize benefit amounts.
BDACTOK:	Board is required to authorize actuarial assumptions.
LIABINS:	Board is covered by liability insurance.

B. Pension Management Practices

ADINVST:	Administrative cost charged to pension investment income.
INVINHS:	Investment staff of pension portfolio is partly (or fully) managed in-house.
ACCINHS:	Accounting staff needs of pension system partly (or fully) met in-house.
TOP10MG:	Plan investments are handled partly (or fully) by external money managers in the

top 10 performance bracket as per Laknonishok et al. (1992).

TOP10*EXT: Plan investments exclusively handled by top 10 money managers.

C. Pension Investment Practices

PRUDMAN: Pension Board required to act according to "prudent man" rule.

INSTATE: Fraction of pension investments which must be directed in-state (%).

STKMAX: There is a maximum limitation on the assets in the pension portfolio.

D. Pension Reporting Practices

INDINVPF: Pension system obtains independent investment performance evaluations.

FREQVAL: Frequency of independent performance evaluations.

REPSOLO: System issues own financial report (not integrated with other budgets).

GIVERPT: Plan participants receive annual financial report.

AMORTPER: Amortization period for past service liabilities.

AMORTMS: Amortization period not stated.

ACTUARUC: Pension system uses unit credit method of computing pension liabilities.

E. Pension Assumptions

COLA: Benefits are partially (or fully) indexed after retirement.

WDOT: Future salary growth assumption required to compute PBO.

WDOTMS: Salary growth assumption not stated.

PORTABLE: Employees moving within state may carry benefit accruals to new plans.

NEXPROR: Interest rate assumption used in computing PBO (%).

EXPRORMS: Interest rate assumption not stated.

INFL: Cost of living assumption required to compute PBO.

INFLMS: Cost of living assumption not stated.

AVRETAGE: Average retirement age used in computing PBO (yrs).

AVRETAGEMS: Average retirement age not stated.

SSINT: Plan is integrated with Social Security.

F. Other Factors

FUNDLAW: State has legal funding standard for pension system.

DEFPOS: State law does not prohibit carryover of state budget deficit from one year to the next (National Association of State Budget Officers 1992)

Table 6 (continued)

TCHRPLAN:	System covers at least some teachers and other school employees.
PTCHR:	Plan exclusively covers teachers and other school employees.
ASSETS:	Actuarial value of pension system assets, typically (though not always) reported at market value (million $).
ASSETSQ:	Squared value of ASSETS.
BOND:	Fraction of pension system portfolio held in corporate and government bonds (%).
STOCK:	Fraction of pension system portfolio held in stock (%).
BENNOCUT:	State has law guaranteeing benefit amounts.
BENTIERS:	Benefits differ according to worker hire date (usually more recent hires receive somewhat lower benefits).
SPECTAX:	A special or dedicated tax is the source of employer contributions.
ISUNION:	At least some of the employees covered by the pension system are unionized.
UNEMPD:	Recent (1990) level of unemployment minus the long run (1981-89) average level of unemployment level in the state (US Bureau of the Census 1991).

Table 7.
Determinants of Investment Returns
in State and Local Pension Plans
(standard errors in parentheses)

	Dependent Variable		
	YR1ROR	**YR5ROR**	**RETURNSD**
Explanatory Variable	1990 Return	1986-90 Return	Return Variability 1986-90
A. Pension Board Composition			
BDELAC	-0.71	-1.65	0.12
	(1.76)	(1.20)	(0.14)
BDELRT	-17.08**	-0.23	0.96*
	(7.14)	(4.68)	(0.53)
B. Pension Management Practices			
ADINVST	-0.34	-1.23**	0.01
	(0.89)	(0.58)	(0.07)
INVINHS	0.80	0.60	-0.04
	(1.36)	(0.92)	(0.16)
TOP10MG	-0.49	-0.32	0.07
	(1.31)	(0.86)	(0.10)
TOP10*EXT	-0.08	-0.33	0.13
	(1.31)	(0.86)	(0.13)
C. Pension Investment Practices			
PRUDMAN	0.83	0.33	-0.001
	(1.20)	(0.84)	(0.10)
INSTATE	-7.74*	-1.63	0.46
	(4.09)	(2.45)	(0.28)
STKMAX	-0.03	0.57	0.004
	(1.18)	(0.86)	(0.10)
D. Pension Reporting Practices			
INDINVPF	-1.16	-0.57	0.12
	(1.00)	(0.68)	(0.08)
FREQVAL	0.70	0.13	-0.07
	(0.54)	(0.55)	(0.06)
E. Other Factors			
TCHRPLAN	-1.27	-0.32	-0.01
	(1.28)	(0.86)	(0.10)
ASSETS	-0.31	0.001	0.001
(*10-3)	(0.165)	(0.11)	(0.01)
ASSETSQ	2.30	0.82	-0.07
(*10-9)	(4.86)	(3.08)	(0.40)

BOND	0.02	0.03**	-0.001 (0.02)
(0.01)	(0.001)		
STOCK	0.03	0.03	-0.001
	(0.03)	(0.02)	(0.002)
Constant	6.56**	9.88**	0.44**
	(2.27)	(1.88)	(.21)
R^2	11.3	12.4	13.6
N	158	132	132

Notes: **t ≥ 1.96, *t ≥ 1.65 (< 1.96).

Table 8.
Determinants of Stock and Flow Funding
in State and Local Pension Plans
(standard errors in parentheses)

Explanatory Variable	Dependent Variable AST_PBO	Flow Fund
A. Pension Board Composition		
BDELAC	-0.20**	0.08
	(0.08)	(0.17)
BDELRT	-0.61*	0.27
	(0.35)	(0.72)
B. Pension Management Practices		
BDBENOK	-0.01	-0.01
	(0.06)	(0.11)
BDACTOK	0.13*	0.30**
	(0.07)	(0.15)
LIABINS	0.13**	-0.19**
	(0.05)	(0.09)
ACCINHS	0.11**	-0.02
	(0.05)	(0.09)
C. Pension Reporting Practices		
REPSOLO	0.05	-0.01
	(0.05)	(0.09)
GIVERPT	0.09	0.003
	(0.08)	(0.15)
AMORTPER	-0.001**	-0.002
	(0.01)	(0.004)
AMORTMS	-0.31**	-0.34**
	(0.09)	(0.16)
ACTUARUC	0.03	-0.13
	(0.08)	(0.17)
D. Pension Assumptions		
COLA	-0.03	0.10
	(0.06)	(0.11)
WDOT	-0.04	0.02
	(0.04)	(0.07)
WDOTMS	-0.35	0.08
	(0.24)	(0.44)
PORTABLE	-0.13**	0.02
	(0.05)	(0.10)
NEXPROR	-0.01	0.02

	(0.04)	(0.04)
EXPRORMS	0.12	0.77
	(0.33)	(0.77)
INFL	-0.03	0.05
	(0.03)	(0.06)
INFLMS	-0.21	0.28
	(0.18)	(0.34)
AVRETAGE	-0.0003	0.001
	(0.01)	(0.01)
AVRETAGMS	0.08	-0.18
	(0.31)	(0.57)

Table 8 (continued)

Explanatory Variable	Dependent Variable AST_PBO	Flow Fund
SSINT	0.02	0.16
	(0.07)	(0.16)
E. Other Factors		
FUNDLAW	0.001	-0.07
	(0.05)	(0.10)
BENNOCUT	0.03	-0.10
	(0.05)	(0.09)
BENTIERS	-0.03	0.03
	(0.05)	(0.10)
DEFPOS	0.08	-0.003
	(0.05)	(0.10)
SPECTAX	0.04	-0.01
	(0.06)	(0.13)
TCHRPLAN	-0.04	-0.02
	(0.07)	(0.12)
ISUNION	0.07	-0.13
	(0.05)	(0.10)
UNEMPD	-0.06**	0.002
	(0.02)	(0.04)
Constant	1.33**	0.44
	(0.45)	(0.84)
R^2	29.0	19.0
N	217	184

Notes: **t ≥ 1.96, *t ≥ 1.65 (< 1.96)

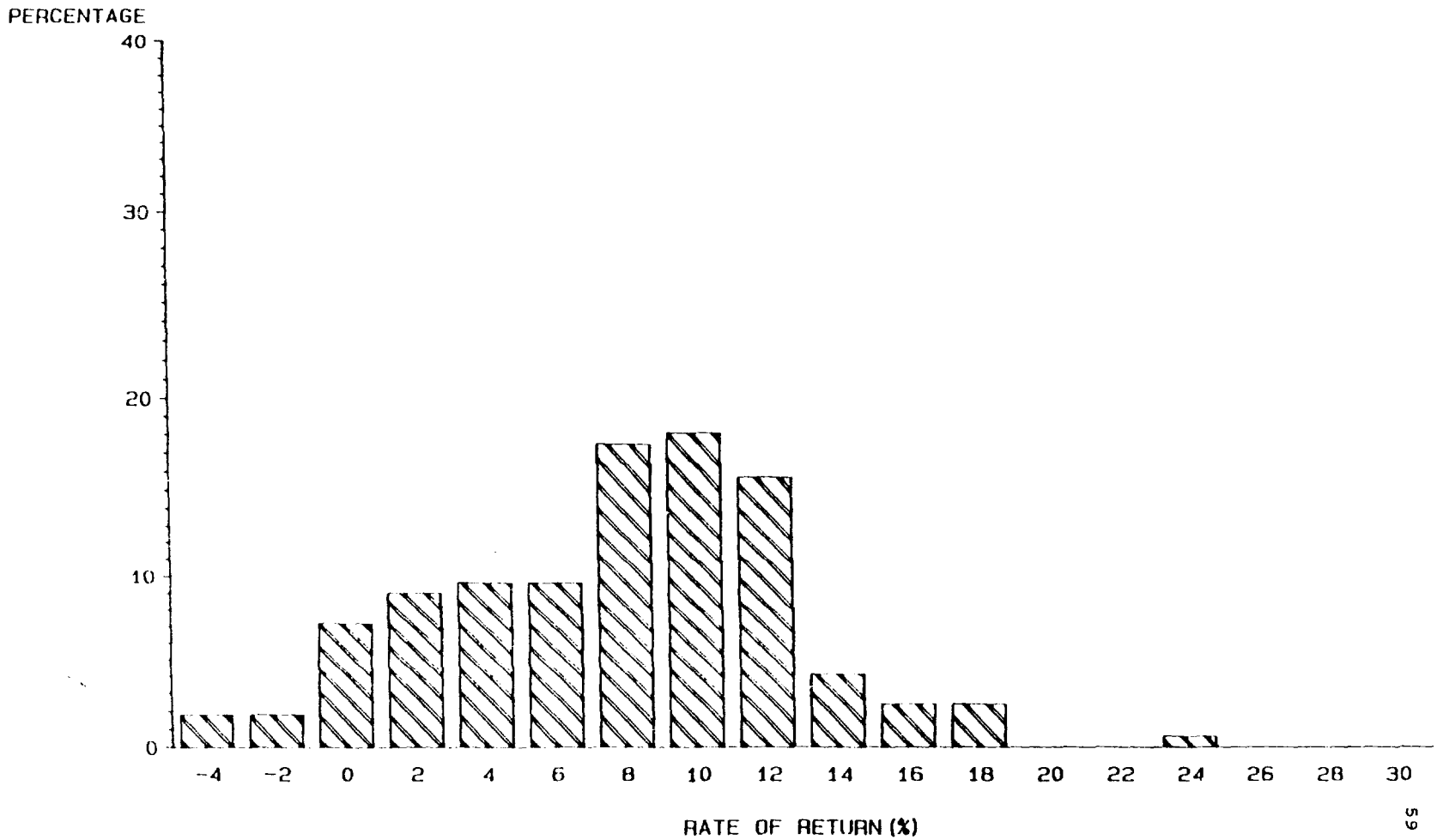
Appendix Table.
Total Administrative Costs as a Percent of Pension Plan Assets by Asset Size Class

	Entire Sample (N)	No External Managers (N)	With External Managers (N)
Asset Size Class ($Million)			
< 100	4.52% (40)	18.50 (6)	2.05 (34)
≥100 to <1,000	1.08% (50)	0.36 (12)	1.30 (38)
≥1,000 to <10,000	0.33% (48)	0.49 (17)	0.25 (31)
≥10,000	0.10% (20)	0.06 (4)	0.12 (16)

Source: Computed from PENDAT data file.

DISTRIB. OF ANNUALIZED MARKET RETURN ON INVESTMENT

---- 1 YEAR ----



IF RATE OF RETURN LE -4 THEN MIDPOINT=-4
IF RATE OF RETURN GT 30 THEN MIDPOINT=30

Figure 2.

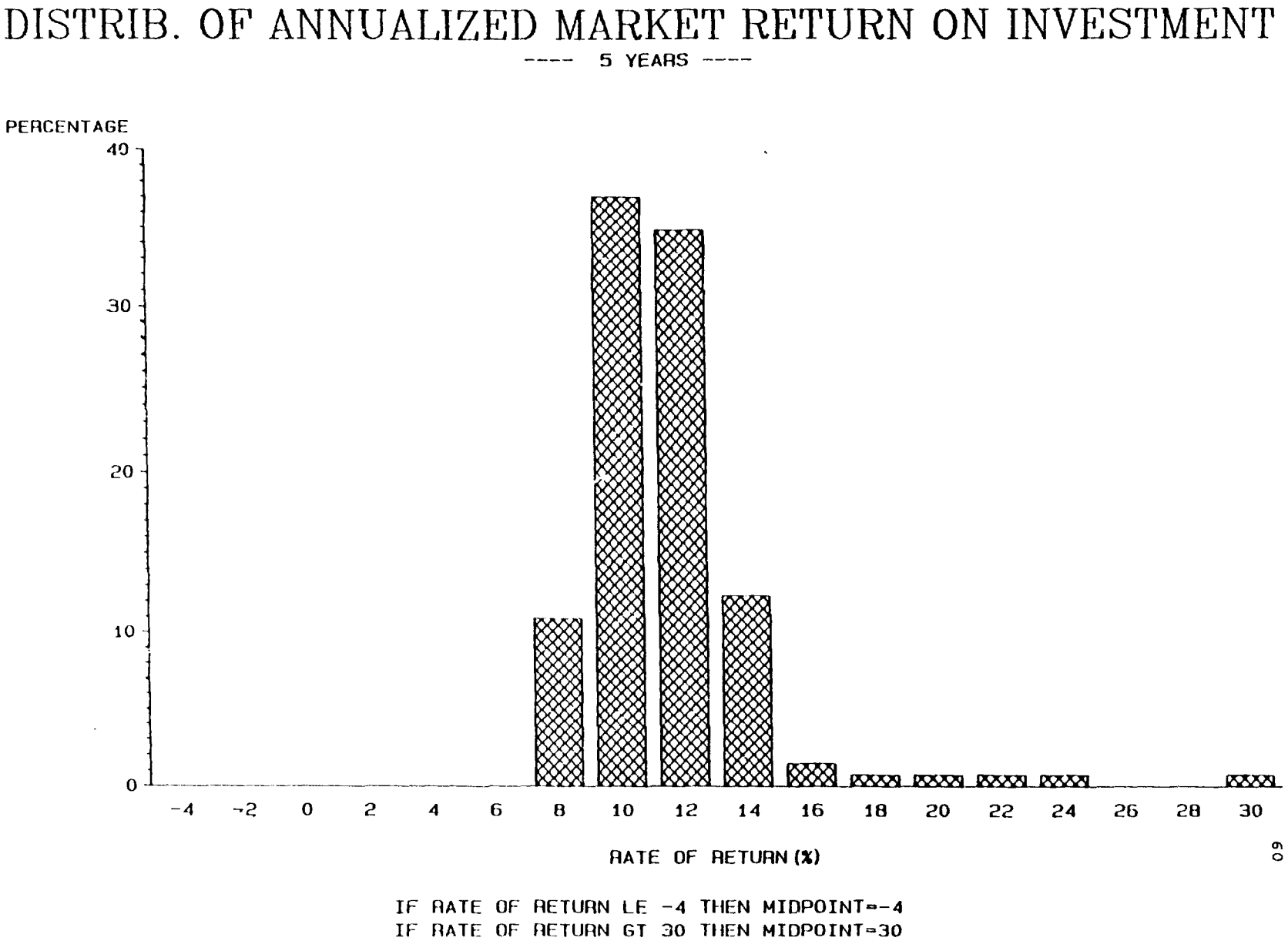

DISTRIB. OF ANNUALIZED MARKET RETURN ON INVESTMENT
---- 5 YEARS ----
PERCENTAGE
40
30
20
10
0
-4
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
RATE OF RETURN (%)
IF RATE OF RETURN LE -4 THEN MIDPOINT=-4
IF RATE OF RETURN GT 30 THEN MIDPOINT=30

Figure 3.

VARIABILITY OF RATE OF RETURN ON INVESTMENT

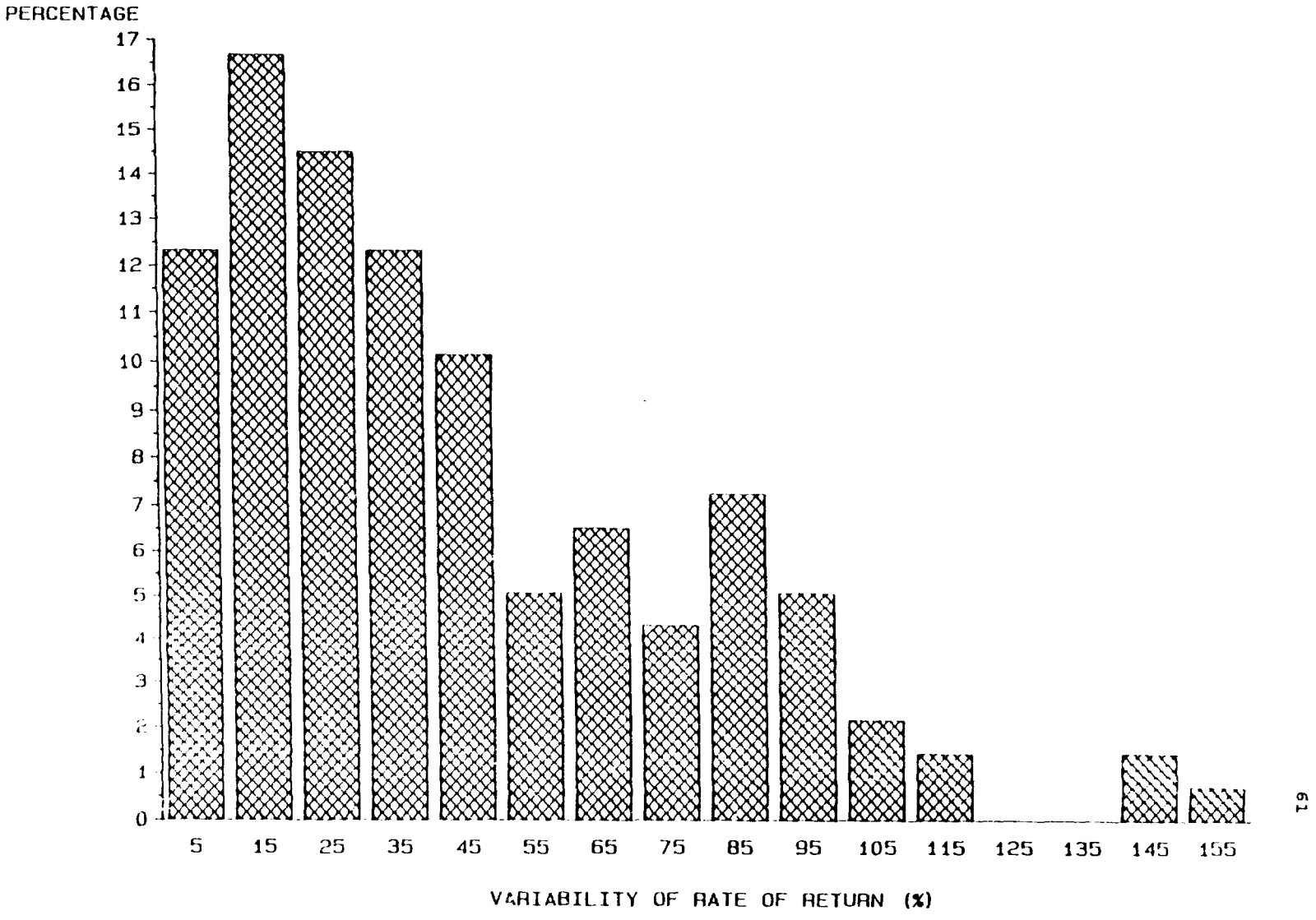
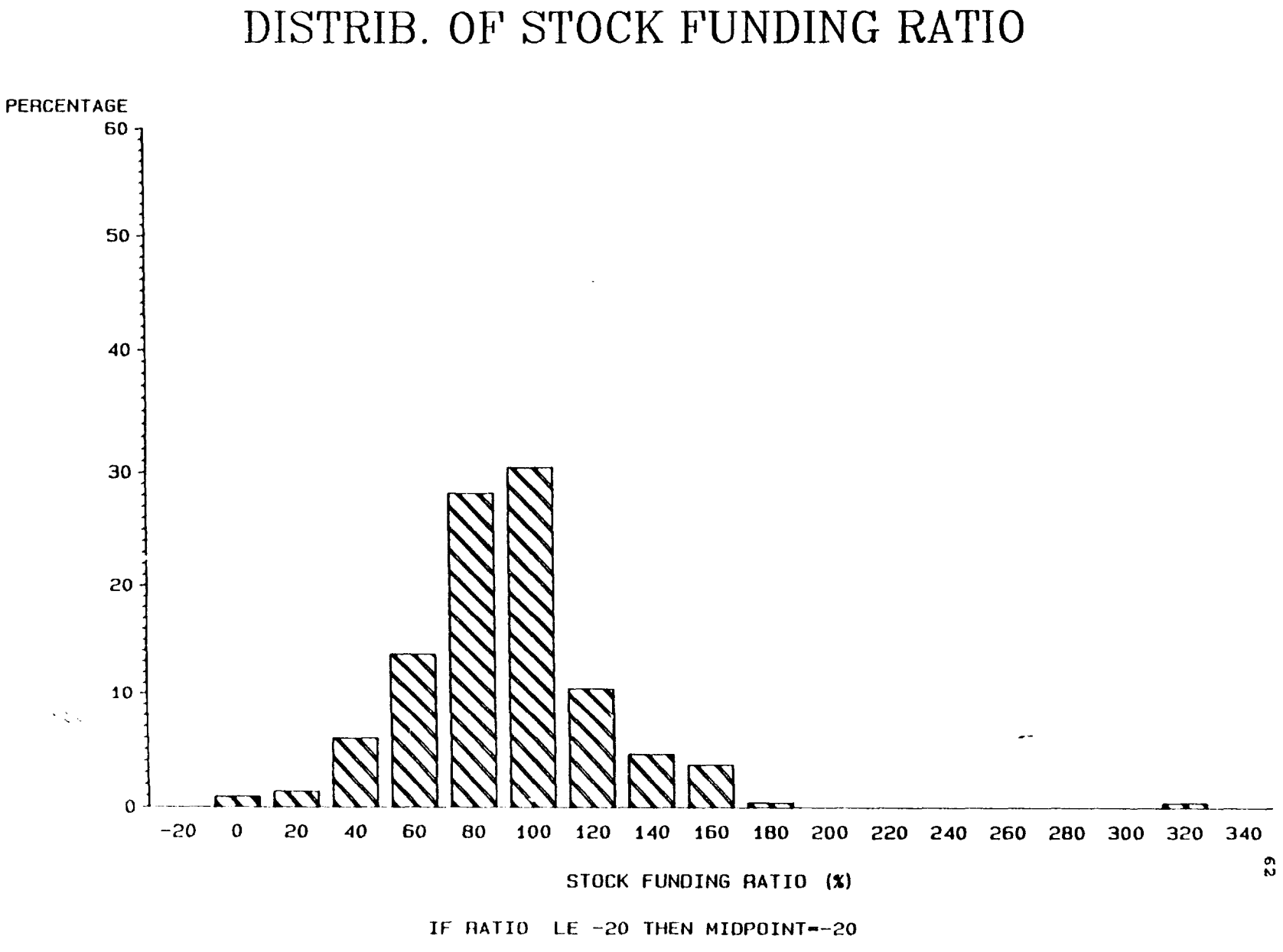
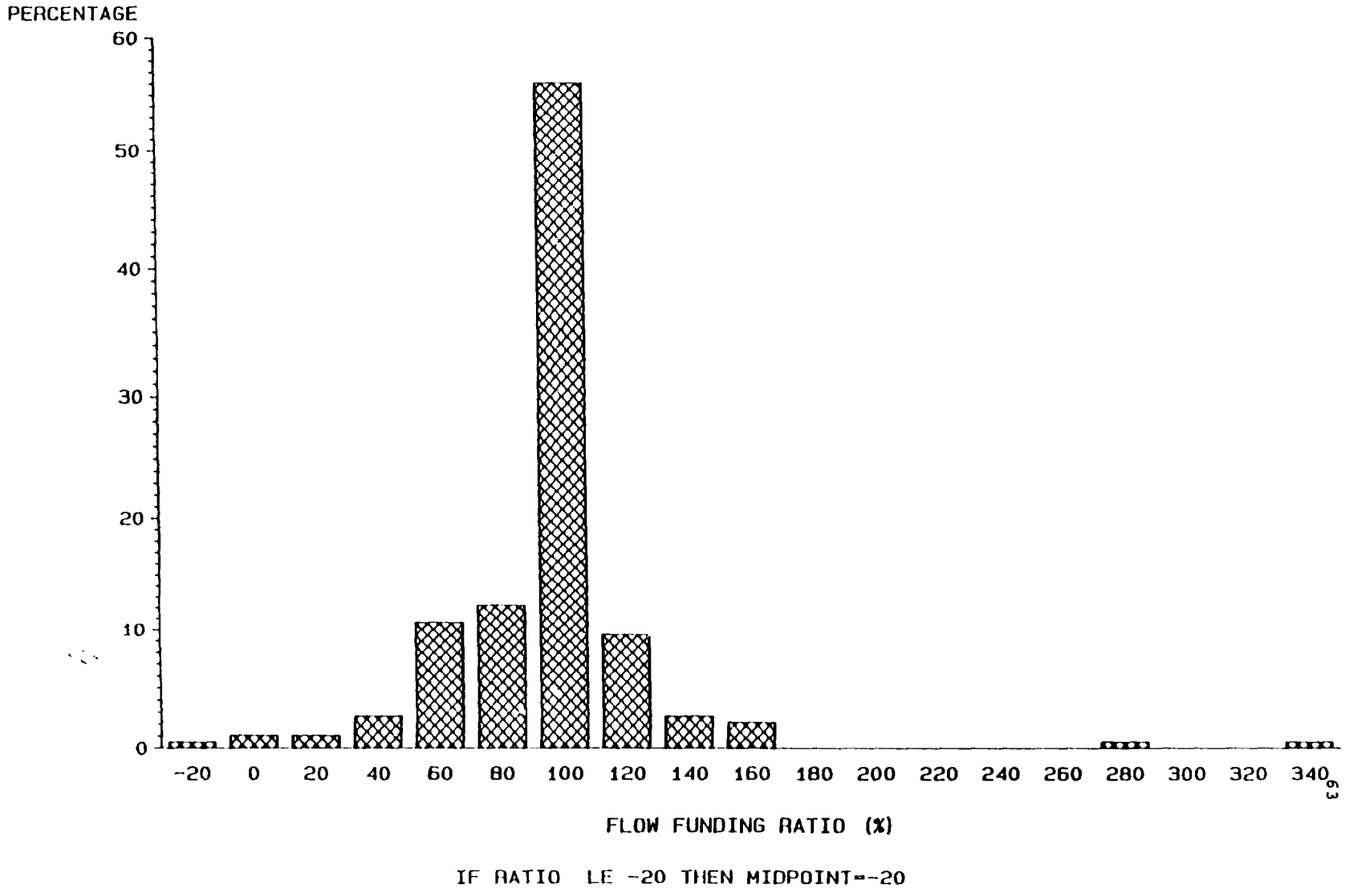


Figure 4.


DISTRIB. OF STOCK FUNDING RATIO
PERCENTAGE
60
50
40
30
20
10
0
-20
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
STOCK FUNDING RATIO (%)
IF RATIO LE -20 THEN MIDPOINT=-20

DISTRIB. OF FLOW FUNDING RATIO



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Endnotes

1.1. Excluded from the PERS designation are national military and federal government employee plans, as well as federal Social Security old-age pensions. These plans are, for the most part, unfunded systems.

2.2. For a discussion of studies on this topic see Beebower and Bergstrom (1977); Berkowitz et al (1986); Brinson et al. (1986); Grinblatt and Titman (1989); McCarthy and Turner (1992); and Ippolito (1984).

3.3. See the Appendix Table for a summary of administrative costs in public pension plans.

4.4. This has been called "window-dressing" at year end so as not to be seen holding "losers" (Benartzi and Thaler 1992).

5.5. In the United States, the Employee Retirement Income Security Act of 1974 (ERISA) requires private sector pension plan assets to be managed according to prudent and conservative investment practice, and furthermore holds plan trustees personally responsible for the plan's investment practices. However ERISA does not cover PERS plans, and efforts to extend national regulation to state and local pensions have been challenged by those who believe that this would undermine states' taxing authority. See Munnell (1983).

6.6. Cessation of benefits has become less likely since ERISA regulations established a government insurance agency for private sector defined benefit private pensions. On the other hand the pension insurance agency is not completely stable financially, and the risk of private pension underfunding is now borne primarily by groups other than those retirees in the underfunded plan; see Gus man and Mitchell (1992).

7.7. The PBO includes five types of prospective pension liabilities as noted in Mitchell and Smith (1992b): benefits pledged to currently retired employees, benefits pledged to vested terminated employees (based on past service and salary levels), benefits payable to vested active employees (based on current service and salary), benefits payable to non-vested active employees who may vest in the future, and benefits that will be earned by current workers resulting from future salary increases. The plan's PBO changes over time reflecting new expected benefit accruals; these yearly accruals are termed the plan's "normal cost." To be actuarially sound, the employer's annual contributions to the plan must be meet normal cost and to amortize any past unfunded pension liabilities.

8.8.Statement based on author's computations using PENDAT 1991 data and personal communication with plan representative.

9.9.For a discussion of recent efforts by numerous public employers to cut public pension funding see Durgin (1991), *Employee Benefit Plan Review* (1991), Hemmerik (1991 a and b), Price (1991), Shine (1991), and Verhovek (1990).

10.10.When there were missing data, this was handled in several ways. Serious reporting errors in pension statistics were rechecked with the PERS plan representatives directly. A complete list of data checks thus generated is available from the author on request. For example the stock funding ratio for Wisconsin was listed in the dataset as 1300%, which the plan representative indicated was incorrect. In the case of missing observations for some of the explanatory variables used in regression models, the variable in question was assigned a value of 0, and concurrently the missing value dummy variable was set to 1. Missing data on the dependent variable (e.g. investment performance or funding) suggested the use of sample selection models to determine whether systems which did report their funding and investment yields had better (or worse) than average outcomes; see Section IV.

11.11.If there is a link between state balanced budget laws and pension funding, it probably arises when state pension contributions are allowed to fluctuate depending on state budget needs, affording politicians on off-budget method of achieving compliance with balanced budget requirements. This can happen since most state budgets typically do not include public pension systems in their regular budget reports. It is has not yet been determined whether the safety-valve argument is empirically important. Certainly balanced budget mandates are widespread: a majority of states (44) have balanced budget laws on the books, and most of these (37) require the governor to sign a balanced budget (NASBO 1992). Only 13 states permit the governor to carry over a budget deficit from one year to the next, providing flexibility which might obviate the need to use the public pension. This latter stance is deemed "most stringent" by NASBO, is represented in the DEFPOS variable developed for this study.

12.12.This one-year yield is somewhat higher than the 6.85% reported in Zorn (1991) who also used the PENDAT file. His sample is smaller since he excluded 39 plans but offers no rationale for their exclusion.

13.13.This 5-year annualized yield is lower than the 13.88% rate reported in Zorn (1991) who also used the PENDAT file. His study is smaller since he excluded 53 plans but offers no rationale for their exclusion.

14.14.For example, President Clinton proposed using pension funds to create infrastructure in his 1992 campaign.

15.15.Zorn (1991) reports a slightly lower stock funding ratio (89%) but uses a much smaller sample size (30 plans) from the PENDAT survey.

16.16.The large negative funding figure was reported by the New York State Teachers' Retirement Plan, where a change in the actuarial method employed explains the negative contribution. A court case is pending on the legality of this change.

17.17.It should be noted that fund trustees appointed by politicians may not necessarily ensure that the plan is operated for the sole benefit of the plan participant. For example, the California public employee retirement system sued the Governor of that state for proposing to replace the 13-member pension board with a newly appointed 9-member board, as well as appointing the plan's actuary who agreed to the Governor's actuarial assumptions (Melbinger 1992).

18.18.Thus these data do not support Munnell and Ernsberger's (1989) suggestion that commingling pension funding with other government budgets may exacerbate funding problems. Those authors also suggested that more centralization might improve funding, but this hypothesis is difficult to test in practice since centralization can refer to many different aspects of plan management. Thus, for example, the actuarial assessment may be conducted centrally even though contributions are collected locally, the benefits administration may be managed centrally even though negotiation over benefits is conducted locally, and so forth.

19.19.Several other models were also examined, including one which entered the state budget deficit variable into the returns equations. . The coefficient was not statistically significant and all other results were unchanged. Also examined were models where the TOP1MGR term was replaced with a term indicating whether any external money manager was used, and results were unchanged.

20.20.A checklist of issues for consideration appears in Mitchell (1993 forthcoming).

21.21.Mitchell (1993 forthcoming) cites examples of data and tax collection problems in developing countries.

22.22.For discussions of the Chilean experience see Baeza (1986), Baeza and Manubens (1988), Cheyre (1991), Diamond (1992), Marcel and Arenas (1992), Myers (1985), and Wallich (1993).

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